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CONTROLLED AND REGULATED PROCESS FOR FULLY AUTOMATIC, CONTINUOUS DRAGÉE-COATING

[Gesteuertes und geregeltes Verfahren zum vollautomatischen, kontinuierlichen Dragieren]

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The invention relates to a controlled and regulated process for fully automatically, continuously dragée-coating solid preparations. /1*

The coating of tablets, pellets, granulates, crystals, capsules, suppositories, hard candies, in dragée-coating apparatuses has been known to the art for a long time. It is carried out in the most diverse dragée-coating media. In all cases, the process of coating can be subdivided into the following partial processes: application of the dragée-coating medium on the product to be dragée-coated, distribution of the dragée-coating medium on the product to be dragée-coated, and drying of the product to be dragée-coated. If these partial processes take their course successively and if this occurs in several repetitions, this is referred to as discontinuous dragée-coating. If they take their course simultaneously, however, it is continuous dragée-coating.

While the still very common sugar dragée-coating still predominantly occurs discontinuously, film coatings are frequently dragée-coated continuously. Such a continuous dragée-coating process is, e.g., described in the German Patent Document 1492029. Automatic dragée-coating processes have already been known to the /2

*Number in the margin indicates pagination in the foreign text.

art for a number of years. They exclusively pertain to discontinuous dragée-coating and can basically be broken down into various principles:

1.) Control via timers that have been preset in the time intervals on the basis of experience gathered in manual dragée-coating. The program then runs without any unwanted changes until the end which can also be programmed.

2.) Control through a determination of the drying state of the dragée shells by measuring the air humidity in the boiler or in the air exhaust pipe, or of the humidity in the products to be coated themselves.

3.) Control by measuring the temperature with the assistance of temperature sensors. In this process, the temperature decrease is determined in comparison with a normal value and utilized for control. The temperature decrease is measurable as long as the solvent evaporates on the applied dragée-coating layer. If the layer is dry, the temperature rises to the above-mentioned normal value whereby a new wetting process can be triggered.

4.) A combination of humidity measurements and an indirect humidity determination through the measurement of temperatures is also used for controlling automatic dragée-coating. In recent times, these processes have become widely accepted because they take into consideration the characteristics of the cores, their

shape and surface, as well as the condition of the dragées inside the boiler, their degree of dryness, and their layer thickness. External factors (room temperature, air humidity) may also be incorporated in the control process. All of that is not possible with time-controlled dragée-coating (comp. H. Moldenhauer et al., Pharmacy 1971, 677).

5.) Control of the respective supplied quantity of the /3
dragée-coating medium through a preceding automatic weight determination of individual pieces of the product which is to be dragée-coated.

A quite sophisticated automatic process on the basis of control via preset timing has already been described by Lachmann and Cooper (J. Pharm. Sci. 52, 490 (1963)). Each individual step of the dragée-coating process can be individually controlled via a punched tape.

The control of the dragée-coating cycle through the determination of the relative air humidity in the dragée-coating boiler is described by the German Patent Application Published for Opposition 1617578. For the same purpose, Heyd reports on a high-frequency-based measurement of the absolute humidity of the product inside the dragée-coating apparatus (comp. A. Heyd, Drug Development Communications 1(2), 133-142 (1974-1975)).

The continuous measuring of temperatures in the product, in order to determine the end point of a dragée-coating cycle and to prompt a new one is disclosed by DE-A-1 960416 and the Belgian Patent No. 831441.

The use of the temperature and/or humidity of the dragée-coating drum atmosphere or of the difference between the incoming and outgoing air humidity or temperature as a controlling quantity has been proposed to control the individual dragée-coating cycles in DE-A-1-2016906.

As has been stated already, all of the above-mentioned processes for automatic dragée-coating pertain to discontinuous dragée-coating. They do not intervene in the respectively running dragée-coating cycle, but, at best, draw corrective control impulses for the succeeding cycle from it.

During a dragée-coating cycle, more or less pronounced fluctuations occur in the temperature of the product which are caused by the respective current balance of cooling by evaporation and heat energy which is supplied or present in the product. In parallel to this, the humidity fluctuates on the surface of the /4
product accordingly. To prevent these varying conditions on the surface of the product over the course of a dragée-coating cycle, as well as the associated impairment of the quality of the coatings, there have been frequent attempts, to the extent

permitted by the dragée-coating medium, to change over the discontinuous process to a continuous dragée-coating process. Moreover, the dragée-coating time could be markedly reduced as a result. To the extent that the temperature of the product and/or the directly or indirectly measured humidity of the product was registered in this continuous dragée-coating process at all, these measurements, however, did not serve to regulate the dragée-coating process. Due to this omission, varying temperatures of the product or humidities of the product over the course of the dragée-coating process and, therefore, in turn, associated impairments of the coated products, had to be accepted.

Fluctuating temperatures of the product and associated fluctuating humidities of the product occur with the continuous dragée-coating process, e.g., if individual working conditions are not kept constant. These considerations include the supplied air quantity, the temperature of the supplied air, the quantity of the exhaust air, the original quality of the product to be dragée-coated, and, above all, the humidity of the supplied air. Additional parameters which may adversely affect the constancy of the temperature and humidity of the product are changes in the addition of the dragée-coating liquid, e.g., caused by a gradual clogging of the spray application nozzle.

Above all, with film coatings which represent the major portion in continuous dragée-coating, fluctuations in the temperature and humidity of the product frequently have an extremely negative impact. This is because, once they have led to irregularities in the coating, these irregularities can no longer be compensated in the further course of the dragée-coating process, or can only be compensated with great difficulty. Aside from optical objections, such irregularities in diffusion coatings or gastric juice-resistant coatings can lead to more or less pronounced impairments of the availability of the active substance. With moisture-sensitive products to be dragée-coated, the /5
described humidity and temperature fluctuations may lead to irreparable changes of the product over the course of the continuous dragée-coating process, either in that physical changes are brought about as a result of penetrating moisture with resulting decomposition changes or a bursting apart, or in that a latent tendency to disintegrate is intensified as a result of the retention of moisture.

In accordance with the invention, the described fluctuations of temperature and humidity in the surface of the product and the associated negative effects are prevented in that, in the framework of a process for the controlled and regulated fully automatic and continuous application of coatings on molded pieces, the surface

temperature and/or the surface humidity of the product to be dragée-coated, which is present in the dragée-coating apparatus, and/or the relative humidity of the exhaust air, and/or the temperature of the exhaust air is/are measured with an appropriate measuring device, the measured data are fed to a control unit which compares them with preset desired data and which, in the event of deviations from the desired values, varies the set quantities of the added quantity of the dragée-coating medium, and/or the supplied air quantity, and/or the supplied air temperature individually or in combination with each other until the desired value of the temperature of the product's surface or the humidity on the surface of the product or the desired value of the relative humidity of the exhaust air or temperature of the exhaust air has been reached.

It is particularly advantageous if the temperature of the product's surface or the humidity of the surface of the product is kept on a preselected desired value. This occurs with the assistance of a control system. The controlling quantities are the temperature of the product's surface, and/or the humidity of the surface of the product, and/or the exhaust air humidity, and/or the temperature of the exhaust air. If the actual value deviates from the desired value now, then a control unit changes the respective adjustable variables until these two values are synchronized again.

Individually or in combination, the following adjustable values are considerations:

a) the speed at which the dragée-coating medium is added, /6

b) the supplied air quantity,

c) the supplied air temperature,

whereas, generally, the adjustable variables a) and b) should be given preference because the supplied air temperature can only be changed quickly enough with the assistance of elaborate mixing apparatuses.

Due to the maintenance of constancy of the product's surface temperature and the humidity of the product surface in accordance with the invention, elaborate processes for keeping the dragée-coating conditions constant, such as the humidity of the supplied air, can be dispensed with. In the same manner, working in accordance with the invention, to the largest extent, independence is gained from the respective absorptive capacity of the original material which is to be dragée-coated, the batch size, the type of the dragée-coating apparatus, and the type of the application device because the process in accordance with the invention does not operate rigidly according to preset data, but constantly adapts to the product which is to be dragée-coated and to the dragée-coating process. Even an accident during the operation, such as the falling off or bursting of a hose filled with dragée-coating

medium, do not have to result in the destruction of the entire batch as before, if, when limit values of the respective adjustable variable are exceeded, an alarm is triggered, and/or certain partial processes of the dragée-coating process, such as, e.g., the added metering of the dragée-coating liquid or of the supplied air, is automatically turned off. Dragée-coating boilers of all shapes with and without perforations can be used for the process in accordance with the invention. The process in accordance with the invention can also be used successfully with dragée-coating apparatuses which work with an air supply into the circulating product to be dragée-coated. The process may even be employed in a vacuum dragée-coating machine; however, then, it is limited to the adjustable variable "addition of the dragée-coating medium".

The dragée-coating liquid can be applied on the product to be dragée-coated by means of multi-component and single-component nozzles, or admission pipe systems.

The automatic dragée-coating in accordance with the invention /7
offers an additional advantage to the developer because he no longer needs to only acknowledge the temperature of the product and the humidity of the product which result from the provided setting parameters during the dragée-coating process, but can, instead, set them on desired values himself. On the one hand, he can thereby freely select conditions favorable for his product, and, on the

other hand, he can validate his process, meaning that he can set the respective limits of the process within which a desired product can be obtained.

The measured values of supplied air, temperature of the supplied air, humidity of the supplied air, exhaust air temperature, humidity of the exhaust air, quantity of the exhaust air, humidity of the product's surface, and the quantity of the added dragée-coating medium, can be stored for documentation and evaluation in accordance with generally standard methods, for instance, by inputting the electric signals in an electronic memory, or by copying them on a telescriber.

Several examples are to explain the working method of the automatic dragée-coating process in accordance with the invention:

<u>Example 1</u> /8

2 kg of tablets (11 mm in diameter and 10 mm curvature radius) are continuously coated with a 10% aqueous hydroxypropylmethyl cellulose solution in an onion-shaped dragée-coating boiler with a diameter of 550 mm under the following conditions:

Supplied air quantity: 120 m^3 / hour

Supplied air temperature: 80°C

Exhaust air quantity: 290 m^3 /hour

The feeding of the dragée-coating solution is carried out by 2-substance nozzle, the measuring of the product's temperature is carried out with a PT 100 sensor.

Boiler speeds: during tempering (without spraying): 1.8 r/min. up to 39°C product temperature, subsequent spraying at 5 r/min until cores are covered (= 10 minutes). More spraying at 20 r/min. The product's temperature is regulated (= regulated variable) to a desired value of 40° ± 1°C above the adjustable variable of the addition of the dragée-coating solution. This adjustable variable works via the variation of the number of revolutions of the feeding pump, a peristaltic pump which precedes a 2-substance nozzle in line. As soon as the temperature which is measured in the boiler moves down somewhat in the preset desired value range, the control unit slows down the number of revolutions of the feeding pump of the dragée-coating liquid. With that, the evaporation energy drops, the supplied air energy gains the upper hand and, as a result, the temperature of the product to be dragée-coated increases. The reverse control process occurs when the product's temperature moves towards the upper limit of the desired value range.

Required spraying time for 0.4 kg of a 10% aqueous hydroxypropylmethyl cellulose solution: 20 minutes. Applied lacquer: 1.94 mg/cm².

Maximum actual value fluctuations of the product's temperature during the spraying process: 40 ± 0.5°C.

The supplied air quantity, as well as the exhaust air quantity /9 were continuously measured with the assistance of one propeller-type anemometer for each and set via a valve.

The measuring of the supplied air temperature is carried out via a resistance thermometer, the temperature setting occurs via a power divider which is connected with the electric heat register. The stepless setting of the respective boiler speed is achieved through a frequency converter which is triggered by the control unit. A 2-substance nozzle with a 1.2 mm circular section jet nozzle and a 2.0 mm airhead opening was used to apply the lacquer solution at an air pressure of 1.5 bar. The peristaltic pump which precedes the spray gun in line can be steplessly regulated via a tyristor.

Example 2

Like Example 1, but with a constant addition of the dragée-coating solution with 20 g/min. and the adjustable variable supplied air quantity.

As soon as the product's temperature that is measured in the boiler moves down somewhat in the preset desired value range, the control unit increases the supplied air quantity. If, on the other hand, the product's temperature approaches the upper limit of the

desired value range, then the control unit decreases the supplied air quantity.

Required spraying time for 0.4 kg of a 10% aqueous hydroxypropylmethyl cellulose: 19 minutes.

Maximum actual value fluctuations of the product's temperature during the spraying process: 40 ± 0.5°C.

Example 3

Like Example 1, however, with a constant addition of the dragée-coating solution with 20 g/min. and the adjustable variable supplied air temperature.

As soon as the product's temperature that is measured in the boiler moves down somewhat in the preset desired value range, the control unit increases the supplied air temperature. If, on the other hand, the product's temperature approaches the upper limit of the desired value range, then the control unit reduces the supplied air temperature.

Required spraying time for 0.4 kg of a 10% aqueous hydroxypropylmethyl cellulose: 22 minutes.

Maximum actual value fluctuations of the product's temperature during the spraying process: 40 ± 2°C.

Example 4

2 kg of tablets (7 mm in diameter and 6 mm curvature radius) are continuously coated with a 9% (wt./wt.) cellulose acetate

phthalate solution in acetone-isopropanol-water (18:27:40 parts by weight) in an onion-shaped dragée-coating boiler with a diameter of 550 mm under the following conditions:

Supplied air temperature: 80°C

Supplied air quantity: 120 m^3 / hour

Exhaust air quantity: 290 m^3 /hour

Boiler speeds as in Example 1.

Regulated variable: product's temperature, measured with PT-100 sensor;

Desired value: 40 ± 1°C;

Adjustable variable: lacquer feeding pump which precedes a 2-substance nozzle in line.

Required spraying time: 70 minutes for 1 kg of lacquer solution.

Applied lacquer: 4.8 mg/cm^2

Max. actual value fluctuations of the temperature of the product to be dragée-coated: 40 ± 0.5°C.

<u>Example 5</u>

2 kg of tablets (10 mm in diameter and 7.5 mm curvature radius) are continuously coated in an onion-shaped dragée-coating boiler with a diameter of 550 mm with a sugar-dragée-coating suspension of the following composition under the following conditions:

gum arabic	50.0 g	/11
polyvinylpyrrolidone 25 000	10.0 g	
saccharose	310.0 g	
polyethylene glycol 6000	20.0 g	
titanium dioxide	40.0 g	
talcum	360.0 g	
water	527.0 g	

Supplied air temperature: 60°C

Exhaust air quantity: 290 m^3/hour.

The feeding of the dragée-coating solution is carried out by 2-substance nozzle. The measuring of the product's temperature is carried out with a PT 100 sensor.

Boiler speeds: tempering (without spraying): 1.8 r/min. up to 44°C product temperature, subsequent spraying at 5 r/min until cores are covered (= 1 minute). More spraying at 20 r/min.

The product's temperature is regulated (= regulated variable) to a desired value of 45° ± 1°C above the adjustable variables of the addition of the dragée-coating solution and the supplied air quantity. These adjustable variables work via the variation of the number of revolutions of the feeding pump, a peristaltic pump which precedes a 2-substance nozzle in line, or via a variation of the supplied air quantity. As soon as the temperature which is measured in the boiler moves downward some in the preset desired value range, the control

unit slows down the number of revolutions of the feeding pump of the dragée-coating liquid and increases the supplied air quantity. With that, the evaporation energy drops, the supplied air energy gains the upper hand, and, as a result, the temperature of the product to be dragée-coated increases. The reverse control process occurs when the product's temperature moves towards the upper limit of the desired value range.

Required spraying time for 0.34 kg of a sugar dragée-coating /12 suspension: 39 min.

Applied solid substance content: 4.81 mg/cm^2

Max. actual value fluctuations of the product's temperature during the spraying process: 45 ± 0.2°C.

Example 6

6 kg of tablets (6 mm in diameter and 15 mm curvature radius) are continuously coated in an apparatus with a perforated boiler (Driacoater Model 500) with a 10% aqueous hydroxypropylmethyl cellulose solution:

Supplied air quantity: 300 m^3 / hour

Supplied air temperature: 80°C

The feeding of the dragée-coating solution is carried out by 2-substance nozzle, the measuring of the product's temperature is carried out with a PT 100 sensor.

Boiler speeds: tempering (without spraying): 1.8 r/min. up to 39°C product temperature, subsequent spraying at 5 r/min until cores are covered (= 10 minutes). More spraying at 20 r/min.

The product's temperature is regulated (= regulated variable) to a desired value of 40° ± 1°C above the adjustable variable of the addition of the dragée-coating solution. This adjustable variable works via the variation of the number of revolutions of the feeding pump, a peristaltic pump which precedes a 2-substance nozzle in line.

Required spraying time for 1.2 kg of a 10% aqueous hydroxypropylmethyl cellulose solution: 12 minutes.

Applied lacquer: 1.96 mg/cm^2.

Maximum actual value fluctuations of the product's temperature during the spraying process: 40 ± 1°C.

Example 7 /13

2 kg of tablets (11 mm in diameter and 10 mm curvature radius) are continuously coated with a 10% aqueous hydroxypropylmethyl cellulose solution in an onion-shaped dragée-coating boiler with a diameter of 550 mm under the following conditions:

Exhaust air quantity: 290 m^3 /hour

The feeding of the dragée-coating solution is carried out by 2-substance nozzle. The measuring of the product's temperature is carried out with a PT 100 sensor.

Boiler speeds: tempering (without spraying): 1.8 r/min. up to 39°C product temperature, subsequent spraying at 5 r/min until cores are covered (= 10 minutes). More spraying at 20 r/min.

The product's temperature is regulated (= regulated variable) to a desired value of 40° ± 1°C above the adjustable variables of the addition of the dragée-coating solution, as well as the supplied air quantity and the supplied air temperature. These adjustable variables work via the variation of the number of revolutions of the feeding pump, a peristaltic pump which precedes a 2-substance nozzle in line, via the variation of the supplied air quantity, and its temperature. As soon as the temperature which is measured in the boiler moves downward some in the preset desired value range, the control unit slows down the number of revolutions of the feeding pump of the dragée-coating liquid, increases the supplied air quantity, as well as its temperature. With that, the evaporation energy drops, the supplied air energy gains the upper hand and, as a result, the temperature of the product to be dragée-coated increases. The reverse control process occurs when the product's temperature moves towards the upper limit of the desired value range.

Required spraying time for 0.4 kg of a 10% aqueous /14
hydroxypropylmethyl cellulose solution: 21 minutes.

Applied lacquer: 1.94 mg/cm^2

Max. actual value fluctuations of the temperature of the product to be dragée-coated during the spraying process: 40 ± 0.5°C.

Example 8

40 kg of tablets (8 mm in diameter and 7 mm curvature radius) are continuously coated in an onion-shaped dragée-coating boiler with a diameter of 900 mm with a lacquer solution of the following composition under the following conditions:

hydroxypropylmethyl cellulose phthalate 50 (Shinetsu/Japan)	1000 g
dibutyl phthalate	100 g
methylene chloride	2500 g
ethanol	6400 g
Supplied air quantity:	290 m^3/hour
Supplied air temperature:	50°C
Exhaust air quantity:	300 m^3/hour.

The feeding of the dragée-coating solution is carried out by 2-substance nozzle, the measuring of the product's temperature is carried out with a PT 100 sensor.

Boiler speeds: tempering (without spraying): 1.8 r/min. up to 31°C product temperature, subsequent spraying at 5 r/min until cores are covered (= 10 minutes). More spraying at 20 r/min.

The product's temperature is regulated (= regulated variable) /15

to a desired value of 32° ± 1°C above the adjustable variable of the addition of the dragée-coating solution. This adjustable variable works via the variation of the number of revolutions of the feeding pump, a peristaltic pump which precedes a 2-substance nozzle in line.

Required spraying time for 20.2 kg of a lacquer solution: 5 hours.

Max. actual value fluctuations of the product's temperature during the spraying process: 32 ± 0.5°C.

Applied solid substance content: 6 mg/cm^2

As already described on page 6, the process in accordance with the invention is also appropriate for generally monitoring the dragée-coating batch. Examples 9 and 10 will explain this:

<u>Example 9</u>

Implementation of dragée-coating process as in Example 8.

However, the dragée-coating apparatus is additionally equipped with two electric limit contacts the triggering values of which can be selected freely and which are triggered when the product's temperature reaches the desired value range. One contact is set to 34°C before the dragée-coating process, the other one is set to 30°C. If, all of a sudden, during the dragée-coating process, a large quantity of the dragée-coating liquid arrives within the boiler, perhaps because the supply hose fell off in the boiler, the

product's temperature drops below 30°C and the upper limit contact responds. It triggers a warning signal and/or, depending upon the preselection, an immediate disconnection of the pump. The boiler continues to run for some more time, in order to prevent an irreversible conglutination of the product to be dragée-coated. Then the equipment is turned off completely and automatically.

If no dragée-coating liquid reaches the product to be dragée- /16 coated any more, perhaps, due to an interruption of the supply line, such as, e.g., a falling off of the hose outside of the dragée-coating boiler, clogging of the nozzle, or empty storage tank, the temperature of the product rises. If the upper limit contact of 34°C is reached, it responds, triggers a warning signal, and/or depending upon the preselection, turns off the pump and sets the boiler on a slow revolution speed for the duration of the post-drying phase, in order to prevent dusting. After a preselected drying period, the equipment turns off entirely.

Example 10

Implementation of the dragée-coating process as in Example 8, but the feeding of the dragée-coating solution is carried out via two (2) 2-substance nozzles which are fed by the pump, which are arranged successively at a right angle to the direction of flow and the product to be dragée-coated. The measuring of the product's temperature is carried out via two (2) temperature measuring

sensors which dip into the product in parallel to the nozzles. The average value of both measuring sensors serves as a regulating variable for the dragée-coating apparatus in accordance with the invention. The automatic apparatus is additionally equipped with two (2) freely preselectable limit contacts which can be triggered after the desired value range of the product's temperature has been reached. One limit contact is set to 31°C, the other one is set to 33°C. If one of the two nozzles becomes clogged now, the automatic apparatus reacts by increasing the pump's number of revolutions, which results in an intensified discharge of the second nozzle. While the average value of the product's temperature can be maintained in this manner, the temperature measuring sensor adjacent to the second nozzle, however, indicates lower values, while the measuring sensor adjacent to the first nozzle indicates higher values. If one and/or the other preselected limit contact value is reached at the temperature measuring sensors, a warning signal is triggered.

Patent Claims /17

1.) Process for the controlled and regulated, fully automatic, continuous application of coatings on molded objects, characterized in that the surface temperature, and/or the surface humidity of the product which is to be dragée-coated and which is present in the dragée-coating apparatus, and/or the relative

humidity of the exhaust air, and/or the temperature of the exhaust air are measured with measuring devices, the measuring values are fed to a control device which compares them with preset desired values, and varies the regulating variables, added quantity of the product to be dragée-coated, and/or the supplied air quantity, and/or the supplied air temperature individually or combined, in the event of any deviations from the desired values until the desired value of the temperature of the product's surface or the humidity of the product's surface, or the desired value of the relative humidity of the exhaust air, or the temperature of the exhaust air, have been reached.

2.) Process, in accordance with Claim 1, characterized in that the surface temperature in the product to be dragée-coated is measured with the assistance of an appropriate measuring device, the measuring values are compared with the desired value, and, in the event of any deviations from the desired value, the added quantity of the dragée-coating medium is varied until the temperature of the surface of the product has again reached the desired value.

3.) Process, in accordance with Claim 1, characterized in that the surface temperature of the product to be dragée-coated is measured with the assistance of one or several appropriate temperature measuring sensors in the product, the measuring values

or their average value is/are compared with the desired value, and, in the event that the desired value is exceeded, the supplied air quantity is varied until the temperature of the product's surface has again reached the desired value.

4.) Process, in accordance with Claim 1, characterized in /18
that the surface temperature of the product to be dragée-coated is measured with the assistance of an appropriate measuring device, the measuring values are compared with the desired value, and, in the event of a deviation from the desired value, the added quantity of the dragée-coating medium and the supplied air quantity are varied until the temperature of the product's surface has reached the desired value.

5.) Process, in accordance with Claim 1, characterized in that the surface temperature of the product to be dragée-coated is measured with the assistance of an appropriate measuring device, the measuring values are compared with the actual values, and, in the event of a deviation from the desired value, the supplied air temperature is varied until the temperature of the product's surface has again reached the desired value.

6.) Process, in accordance with Claim 1, characterized in that the surface temperature of the product to be dragée-coated is measured with the assistance of an appropriate measuring device, the measuring values are compared with the actual value, and, in

the event of a deviation from the desired value, the supplied quantity of the dragée-coating medium, and/or the supplied air, and/or the supplied air temperature is varied until the temperature of the product's surface has again reached the desired value.

7.) Process, in accordance with Claim 1, characterized in that the surface humidity of the product to be dragée-coated is measured with the assistance of a measuring device, the measuring values are compared with the actual values, and, in the event of a deviation from the desired values, the added quantity of the dragée-coating medium, and/or the supplied air, and/or the supplied air temperature is varied until the temperature of the product's surface has again reached the desired value.

8.) Process, in accordance with Claim 1, characterized in /19
that the relative humidity of the exhaust air is measured, the measuring values are compared with the desired value, and, in the event of any deviations from the desired value, the added quantities of the dragée-coating medium, and/or the supplied air quantity, and/or the supplied air temperature are varied until the relative humidity of the exhaust air has again reached the desired value.

9.) Process, in accordance with Claim 1, characterized in that the temperature of the exhaust air is measured, the measuring

values are compared with the desired value, and, in the even of any deviations from the desired value, the added quantity of the dragée-coating medium, and/or the supplied air quantity, and/or the supplied air temperature is varied until the exhaust air has again reached the desired value.

10.) Dragée-coating process, in accordance with Claims 1 - 9, characterized in that aqueous preparations, organic preparations, organic-aqueous preparations, lacquer solutions, or suspensions are used as dragée-coating media.

11.) Process, in accordance with any of the Claims 1 to 10, characterized in that, when preselected limit values of the regulated variables are reached, warning signals, and/or switchover, and/or disconnection processes are triggered automatically.

2/5/2 (Item 1 from file: 351)
DIALOG(R)File 351:Derwent WPI

004212368
WPI Acc No: 1985-039248/*198507*
XRAM Acc No: C85-016895
XRPX Acc No: N85-029208

Rotary pan machine for sugar spray enrobing homeopathic pills etc. - has internal magnetron to heat dry prod. with microwave radiation

Patent Assignee: BOIRON LAB SA (BOIR-N)
Inventor: ABECASSIS J; BAUME B; FAVIER A M
Number of Countries: 011 Number of Patents: 003
Patent Family:

Patent No	Kind	Date	Applicat No	Kind	Date	Week	
EP 132480	A	19850213	EP 83420136	A	19830729	198507	B
EP 132480	B	19880127				198804	
DE 3375454	G	19880303				198810	

Priority Applications (No Type Date): EP 83420136 A 19830729
Cited Patents: DE 2423933; DE 2731351; FR 1411335; FR 2137170; FR 2374968
Patent Details:

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Designated States (Regional): AT BE CH DE FR GB IT LI LU NL SE

Patent No	Kind	Lan	Pg	Main IPC	Filing Notes
EP 132480	B	F			

Designated States (Regional): AT BE CH DE FR GB IT LI LU NL SE

Abstract (Basic): EP 132480 A

A machine for mfg. a batch of sugar or sugar coated granules, pills, dragees etc.. The machine is of the type in which the prod. is tumbled in a rotary pan or drum into which is sprayed at liq., partic. sugar syrup, to enrobe the prod..

The machine is equipped with a magnetron type microwave generator which directs electromagnetic waves into the prod. in the course of formation.

Pref. the microwave generator operates at a frequency of about 2.450 mHz. and this type of radiation heat right through to the heart of the prod.. Air is circulated through the pan or drum to eliminate vapour released by the heat. The prod. is pref. a homeopathic pharmaceutical pill, granule, dragee etc. with an internal structure of radially orientated microchannels.

USE/ADVANTAGE - Machine for the mfr. of batches of sugared pills, granules, dragees, bonbons, etc., esp. homeopathic pharmaceutical pills. The pan-enrobing process for homeopathic pills has a duration of some 20 days of which 80-90% is drying time. With microwave heating and ventilated drying the time is reduced to about 8 days with a considerable redn. in mfg. cost. There is no longer any danger of internal moisture causing a transparency of outer layer which suggests loss of freshness to the consumer.

Title Terms: ROTATING; PAN; MACHINE; SUGAR; SPRAY; ENROBED; HOMEOPATHIC; PILL; INTERNAL; MAGNETRON; HEAT; DRY; PRODUCT; MICROWAVE; RADIATE
Derwent Class: B07; D13; P33
International Patent Class (Additional): A23G-003/26; A61J-003/00
File Segment: CPI; EngPI
?

1/5/2   (Item 1 from file: 351)
DIALOG(R)File 351:Derwent WPI

004526534
WPI Acc No: 1986-029878/*198605*
XRAM Acc No: C86-012390
XRPX Acc No: N86-021529

Continuous coating appts. for confectionery - applies crumble in revolving drum to spherical soft articles

Patent Assignee: VEB FORSCH RATION S (RATI-N)
Inventor: NIECKAU B
Number of Countries: 001 Number of Patents: 002
Patent Family:

Patent No	Kind	Date	Applicat No	Kind	Date	Week	
DE 3519052	A	19860123	DE 3519052	A	19850528	198605	B
DE 3519052	C	19870903				198735	

Priority Applications (No Type Date): DE 3519052 A 19850528
Patent Details:

Patent No	Kind	Lan	Pg	Main IPC	Filing Notes
DE 3519052	A		13		

Abstract (Basic): DE 3519052 C

Appts. for continuously coating soft plastic foods with crumble or the like comprises a rotatable pipe having a horizontal axis and with a mesh fixed just inside its wall entirely around its circumference and along its length. The mesh is sufficiently large to permit the crumble to pass through. At intervals along the pipe, sets of scoops, staggered from one another by 180 deg., lead tangentially from the inner face of the pipe to a point above the axis. Here they deflect the scooped material into central receivers, which terminate as discharge ducts. The articles to be coated are fed in at one end, and pass together with the crumble into the pipe. Plates at the two ends of the drum have circular openings at the centre.

USE/ADVANTAGE - For coating confectionery articles and the like with crumble and similar substances. Simple but effective. (13pp Dwg.No.0/2)

Title Terms: CONTINUOUS; COATING; APPARATUS; CONFECTION; APPLY; CRUMBLE; REVOLVING; DRUM; SPHERE; SOFT; ARTICLE
Derwent Class: D13; P42
International Patent Class (Additional): A21C-009/04; A23G-003/20; B05C-019/00
File Segment: CPI; EngPI
?

XP-002183318

AN - 1986-194643 [30]
AP - JP19840250805 19841128
CPY - MATU
DC - F07 Q76
DR - 1679-U
FS - CPI;GMPI
IC - D06F58/24 ; F26B21/00
MC - F03-J01
PA - (MATU) MATSUSHITA ELEC IND CO LTD
PN - JP61128999 A 19860617 DW198630 004pp
PR - JP19840250805 19841128
XA - C1986-083965
XIC - D06F-058/24 ; F26B-021/00
XP - N1986-145470
AB - J61128999 The drier consists of fan; heater for regeneration of dehumidifier agent, lithium chloride,; heat exchanger for heat recovery from regeneration air; fan for air. Air from outside is supplied to low temp. side of exchanger, preheated and heated by heater regenerates dehumidifying medium, further, supplied to high temp. side of exchanger and exhausted.
- USE/ADVANTAGE - Regeneration of medium is carried out efficiently by recovering heat. Heat efficiency is improved significantly and shortens drying time without increasing heater input. (4pp Dwg.No 0/4)
IW - HOT AIR CLOTHING DRY COMPRISE FAN HEATER REGENERATE DEHUMIDIFY AGENT HEAT EXCHANGE HEAT RECOVER REGENERATE AIR FAN
IKW - HOT AIR CLOTHING DRY COMPRISE FAN HEATER REGENERATE DEHUMIDIFY AGENT HEAT EXCHANGE HEAT RECOVER REGENERATE AIR FAN
NC - 001
OPD - 1984-11-28
ORD - 1986-06-17
PAW - (MATU) MATSUSHITA ELEC IND CO LTD
TI - Hot air clothing drier - comprises fan, heater for regeneration of dehumidifier agent, heat exchanger for heat recovery from regeneration air and fan